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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,790	10/30/2003	Albert J. Shih	UOM 0305 PUS	8118

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EXAMINER

GREENE, JASON M

ART UNIT	PAPER NUMBER
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1724

DATE MAILED: 09/01/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/696,790

Applicant(s)

SHIH ET AL.

Examiner

Jason M. Greene

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-16 is/are rejected.
- 7) ☒ Claim(s) 10 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/26/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Drawings

1. The drawings were received on 4 March 2004. These drawings are acceptable.

Claims

2. Claim 1 recites the phrase "said porous and conductive heating element" in lines 9-10. However, the claim does not previously recite the filter device having a porous and conductive heating element. The Examiner notes that it appears as though the phrase "said porous and conductive heating element" was intended to read as "said porous and conductive filter element." If this is correct, the Examiner suggests Applicants amend the claim accordingly to provide proper antecedent basis. Additionally, the Examiner also suggests Applicants change the word "heating" at the beginning of line 2 in claims 2 and 3 and in line 4 of claim 6 to the word "filter".
3. With regard to claim 6, the Examiner suggests Applicants change the word "electrode" at the end of line 6 to read as "electrodes" to correct a minor grammatical informality.

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4. Claim 9 is an apparatus claim directed to a filter device. However, the terminal claim limitation reads as a method step since it recites the phrase "further comprising increasing the thickness" in lines 7-8. Accordingly, the Examiner suggests Applicants rewrite the phrase "further comprising increasing the thickness of said filter element from its thickness at said first electrode to a greater thickness at said second electrode" to read as "wherein the thickness of the filter element increases from its thickness at said first electrode to a greater thickness at said second electrode" to improve the clarity, precision and readability of the claim language.

5. With regard to claim 11, the phrase "and/or" in line 9 has been interpreted to mean that the process can include steps a, b1, c1 and d; a, b2, c2 and d; or a, b1, c1, b2, c2 and d.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 2 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Claim 2 recites the improper Markush group "wherein said porous, conductive heating (filter) element is selected from the group of conductive foams, conductive sintered particles, mesh screens, and combinations thereof" in lines 1-3. For examination purposes, the Examiner has assumed that the group was intended to be close ended. If this assumption is correct, the Examiner suggests Applicants insert the word "consisting" between the words "group" and "of" in line 2.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 2, 4 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Fukui et al.

With regard to claims 1 and 2, Fukui et al. discloses a filter device suitable for removing particulates from a gas stream comprising a duct (casing 22) for conveying a gas stream, position in the duct across the flow of gas, at least one electrically resistively heatable porous and conductive filter element (24A-24D), and means (energizing means and electrodes 26A-26C and 28A-28B) for providing electrical

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energy to said porous and conductive filter element for resistively heating said porous and conductive filter element, wherein the porous, conductive filter element comprises conductive foam in Figs. 18(a) and 18(b), col. 8, lines 27 and col. 10, line 37 to col. 11, line 5.

With regard to claims 4 and 5, Fukui et al. discloses an interior of the duct being electrically conductive, a periphery of a porous conductive filter element being bonded with electrical continuity (via electrodes 28A and 28B) to said electrically conductive interior of said duct, and a central portion of said porous conductive filter being bonded with electrical continuity to a conductive electrode (26A-26C) positioned within the duct, wherein said duct comprises a metal tube (casing 22), and said electrode comprising a metal rod (26A-26C), an outer periphery of said porous conductive filter bonded with electrical continuity (via electrodes 28A and 28B) to said tube, and an inner periphery of a hole within said filter bonded with electrical continuity to said metal rod in Figs. 18(a) and 18(b) and col. 10, line 37 to col. 11, line 5. The Examiner notes that the term "optionally" has been interpreted to mean that the rod can be, but is not necessarily, hollow.

10. Claims 1, 2, 4 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Bolt et al.

With regard to claims 1 and 2, Bolt et al. discloses a filter device suitable for removing particulates from a gas stream comprising a duct (housing 1) for conveying a gas stream, position in the duct across the flow of gas, at least one electrically resistively heatable porous and conductive filter element (5a), and means (high voltage source 6 and filter holders 5b) for providing electrical energy to said porous and conductive filter element for resistively heating said porous and conductive filter element, wherein the porous, conductive filter element comprises conductive sintered metallic particles in Figs. 1 and 2 and col. 4, line 46 to col. 3, line 20.

With regard to claim 4, Bolt et al. discloses an interior of the duct being electrically conductive, a periphery of a porous conductive filter element being bonded with electrical continuity (via the leftmost filter holder 5b) to said electrically conductive interior of said duct, and a central portion of said porous conductive filter being bonded with electrical continuity to a conductive electrode (rightmost filter holder 5b) positioned within the duct in Figs. 1 and 2 and col. 4, line 46 to col. 3, line 20.

With regard to claim 9, Bolt et al. discloses the filter element (5a) comprising a first metal electrode or being bonded with electrical continuity to a first metal electrode (rightmost filter holder 5b) to provide a contact area between the filter element and a first electrode and to a second electrode (leftmost filter holder 5b), said filter element providing a conductive path between said first and second electrodes, and wherein the line of electrical contact between said filter element and said first electrode is greater

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(due to the tapered walls on the conically-shaped right side of the filter element) in plan than the line of electrical contact of said filter element and said second electrode, wherein the thickness (the cross-sectional area) of the filter element increases from its thickness at said first electrode to a greater thickness at said second electrode in Fig. 2. The Examiner notes that the tapered filter walls contacting the first electrode at an acute angle have a greater cross-sectional area in contact with the electrode than the parallel walls of the filter element contacting the second electrode at an orthogonal angle. The examiner also notes that the transitional phrase "contains" has been interpreted as being open-ended.

11. Claims 1-3 and 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Inagami et al.

With regard to claims 1-3, Inagami et al. discloses a filter device suitable for removing particulates from a gas stream comprising a duct (the tube) for conveying a gas stream, position in the duct across the flow of gas, at least one electrically resistively heatable porous and conductive filter element, and means for providing electrical energy to said porous and conductive filter element for resistively heating said porous and conductive filter element, wherein the porous, conductive filter element comprises conductive ceramic and metallic reticulated foams in col. 2, line 51 to col. 5, line 18.

With regard to claim 6, Inagami et al. discloses the filter element having a periphery, and bonded to non-adjacent portions of said periphery are a first conductive electrode and a second conductive electrode, said electrically resistively heatable porous and conductive filter element providing a conductive path between the first electrode and the second electrode such that the filter element is heated when an electrical potential is applied between the first and the second electrodes in col. 2, line 51 to col. 5, line 18.

With regard to claims 7 and 8, Inagami et al. discloses the duct (tube) being a non-conductive ceramic or glass and thermal insulation surrounding at least a portion of the duct in col. 3, lines 55-59 and col. 4, lines 60-65.

12. Claims 11, 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Fukui et al.

Fukui et al. discloses a process for the filtration of a gas stream comprising thermally deactivatable particles comprising providing a filter device of claim 1, and heating one or more of said at least one filter elements (24A-24D) of said filter device by passing an electric current through said one or more filter elements to provide one or more heated filter elements, and passing said gas through said one or more heated filter elements, and passing said gas through said one or more filter elements of said filter device, thereby trapping particulates on one or more filter elements, and heating at least one of said one or more filter elements to a high temperature sufficient to destroy

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particulates trapped thereon or to render pathogens trapped thereon non-viable, and obtaining from an exit of said filter device a gas stream depleted of particulates and/or viable pathogens, wherein the filter device is positioned in an exhaust stream of a diesel internal combustion engine in Figs. 18(a) and 18(b), col. 8, lines 27 and col. 10, line 37 to col. 11, line 5.

13. Claims 11, 14 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by Bolt et al.

Bolt et al. discloses a process for the filtration of a gas stream comprising thermally deactivatable particles comprising providing a filter device of claim 1, and heating one or more of said at least one filter elements (5a) of said filter device by passing an electric current through said one or more filter elements to provide one or more heated filter elements, and passing said gas through said one or more heated filter elements, and passing said gas through said one or more filter elements of said filter device, thereby trapping particulates on one or more filter elements, and heating at least one of said one or more filter elements to a high temperature sufficient to destroy particulates trapped thereon or to render pathogens trapped thereon non-viable, and obtaining from an exit of said filter device a gas stream depleted of particulates and/or viable pathogens, wherein the filter device is positioned in an exhaust stream of a diesel internal combustion engine in Figs. 1 and 2 and col. 4, line 46 to col. 3, line 20.

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14. Claims 11-13 are rejected under 35 U.S.C. 102(b) as being anticipated by Inagami et al.

With regard to claim 11, Inagami et al. discloses a process for the filtration of a gas stream comprising thermally deactivatable particles comprising providing a filter device of claim 1, and heating one or more of said at least one filter elements of said filter device by passing an electric current through said one or more filter elements to provide one or more heated filter elements, and passing said gas through said one or more heated filter elements, and passing said gas through said one or more filter elements of said filter device, thereby trapping particulates on one or more filter elements, and heating at least one of said one or more filter elements to a high temperature sufficient to render pathogens trapped thereon non-viable, and obtaining from an exit of said filter device a gas stream depleted of viable pathogens in col. 2, line 51 to col. 5, line 18.

With regard to claims 12 and 13, Inagami et al. discloses the filter device being employed to filter a stream of gas comprising or potentially comprising at least one pathogenic microorganism, wherein at least one filter element is resistively heated to a temperature such that the microorganisms are rendered non-viable in col. 1, lines 9-25. While the reference does not explicitly recite the microorganism being one of the instantly claimed microorganisms, one of ordinary skill in the art at the time the invention

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was made would have at one envisaged the phrase "pathogenic bacteria or viruses" encompassing at least one of anthrax, SARS, TB, smallpox, pneumonia and ebola.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

16. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukui et al. or Bolt et al. in view of Jha et al.

Fukui et al. and Bolt et al. do not teach the porous, conductive filter element comprising a metal foam.

Jha et al. discloses a similar filter device comprising a porous, conductive filter element formed from metallic nickel foam in Figs. 1-3 and col. 2, line 32 to col. 4, line 60.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the metallic foam of Jha et al. for the ceramic foam of Fukui et al. to provide a filter element having improved ductility to lessen the chance of the filter element being damaged due to mechanical vibrations, as suggested by Jha et al. in col. 3, lines 63-66. It would have been obvious to one of ordinary skill in the art at

the time the invention was made to substitute the metallic foam of Jha et al. for the sintered metal of Bolt et al. to provide a filter element having higher mechanical strength, a larger pore structure and lower density, as suggested by Jha et al. in col. 5, lines 49-61.

17. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fukui et al. or Bolt et al. in view of Pfister et al.

Fukui et al. or Bolt et al. do not disclose thermal insulation surrounding at least a portion of the duct.

Pfister et al. discloses a similar filter device wherein thermal insulation (2) surrounds the duct (housing 1) in Fig. 1 and col. 5, lines 10-16.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the thermal insulation of Pfister et al. into the filter devices of Fukui et al. and Bolt et al. to minimize the amount of energy required to heat the filter elements and to protect the surrounding components from needless heating, as suggested by Pfister et al. in col. 5, lines 10-16.

18. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inagami et al. in view of Smets.

Inagami et al. does not disclose heated gas exiting the filter device being routed through a heat exchanger and a gas stream to be passed through the filter device also

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being routed through the heat exchanger, said gas stream being heated and said heated gas being cooled by transfer of heat in said heat exchanger.

Smets discloses a similar process wherein heated gas exiting the filter device (34) is routed through a heat exchanger (54) and a gas stream to be passed through the filter device also is routed through the heat exchanger, said gas stream being heated and said heated gas being cooled by transfer of heat in said heat exchanger in Fig. 7 and col. 6, line 57 to col. 7, line 6.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the heat exchanger of Smets into the process of Inagami et al. to pre-heat the gas entering the filter device to reduce the amount of energy required to sterilize the gas stream, as suggested by Smets in col. 6, line 57 to col. 7, line 6.

Allowable Subject Matter

19. Claim 10 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. The following is a statement of reasons for the indication of allowable subject matter:

With regard to claim 10, Fukui et al. discloses the filter element having a circular cross-section and a thickness in a direction orthogonal to said circular cross-section, an outer periphery bonded to first electrode (28A,28B), and a centrally located hole bonded to a centrally located second electrode (26A-26C), the thickness of the filter element being constant from its thickness at said first electrode to its thickness at a second electrode in Figs. 18(a) and 18(b).

The prior art made of record does not teach or fairly suggest the filter device of claim 10 wherein the thickness of the filter element increases from its thickness at said first electrode to a greater thickness at said second electrode. Additionally, since Applicants teach the claimed non-uniform thickness providing a substantially constant electrical resistivity across the cross-sectional area of the filter element, the particular shape claimed by Applicants is more than a mere choice of design. See the instant specification at page 10, line 27 to page 11, line 8.

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Dasgupta, Sparling et al., Pasic, Feldman et al., Schönauer, Ueda et al. and Becker et al. references disclose similar filter devices.

22. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Greene whose telephone number is (571)


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272-1157. The examiner can normally be reached on Monday - Friday (9:00 AM to 5:30 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on (571) 272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jason M. Greene
Examiner
Art Unit 1724


8/30/05

jmg
August 30, 2005